

MANUAL

JK-310

JK AUDIO

CAUTION!

STATIC ELECTRICITY CAN DESTROY SOME INTEGRATED CIRCUITS ON THE JK-310 AND ALSO YOUR COMPUTER.

NEVER CONNECT OR DISCONNECT YOUR JK-310 TO YOUR COMPUTER WHEN THE POWER IS APPLIED TO EITHER ONE OF THEM.

THE POWER SUPPLY CAN BE CONNECTED TO THE USER PORT CONNECTOR (44 PIN STANDARD) OR STRAIGHT TO THE COMPUTER AS NORMAL. IF THE POWER CUBE THAT IS CONNECTED DIRECTLY TO THE COMPUTER IS USED THEN THE RESET SWITCH WILL NOT WORK CORRECTLY. THE RESET SWITCH IN THE JK-310 IS USED TO KEEP POWER TO THE INTERFACE BOARD ON (THIS KEEPS THE SAME STATE OF THE OUTPUT LATCHES) AND RESET OR TURN OFF THE COMPUTER. UP IS ON AND DOWN IS OFF.

HOW DOES IT WORK

LET'S IMAGINE THAT YOU WANT LIGHTS OR INDICATORS ON ALL THE OUTPUT LINES AND YOU WANT TO LABEL THEM 1 THROUGH 8. SUPPOSE YOU WANTED LIGHT #6 ON AND ALL THE REST OFF.

10 POKE 16382,1

THIS SETS UP A CONTROL WORD ON THE I/O BOARD AND LETS IT KNOW THAT YOU WANT TO TALK TO THE OUTPUT PORT.

20 POKE 16383,32

THIS SENDS OUT BINARY NUMBER 32 (LIGHT #6 ON) WHICH HAS BEEN DIRECTED TO THE OUTPUT PORT IN LINE 10.

X

THAT'S IT!

IF YOU WANT MORE THAN ONE LIGHT ON AT A TIME THEN SIMPLY ADD UP THE X'S.

INPUT PORT

THE INPUT PORTS WORK IN A VERY SIMILAR MANNER. SUPPOSE YOU HAD 8 SWITCHES, S1-S8, AND YOU WANTED TO CHECK THE STATE OF ALL OF THEM AND SEE IF THEY HAVE BEEN ACTIVATED.

SOFTWARE

PRINT PEEK 16382

IF AN 8 IS PRINTED ON THE SCREEN THEN WE KNOW THAT SWITCH #4 IS ACTIVATED BY LOOKING IN THE BINARY TABLE. IF A 162 (128+32+2) WAS PRINTED THEN WE KNOW THAT SWITCHES #8, #6, AND #2 ARE ACTIVATED.

BINARY TABLE

PORT PORT

0	1	x = 1	6	7	x = 64
1	2	x = 2	7	8	x = 128
2	3	x = 4	1 and 4		x = 9
3	4	x = 8	7 and 4		x = 72
4	5	x = 16	3 and 8		x = 132
5	6	x = 32	5 and 6		x = 48

HARDWARE

THE EDGE CONNECTOR THAT ALL THE I/O PORT AND CONTROL SIGNALS ARE CONNECTED TO IS

THE STANDARD 44 PIN .156 SPACING WHICH RADIO SHACK SELLS CAT. # (276-1551). THE REASON THIS CONNECTOR IS USED IS BECAUSE RADIO SHACK SELLS EXPERIMENTER CARDS THAT YOU CAN USE TO BUILD UP YOUR OWN IDEAS.

WITH NOTHING ON INPUTS, PEEK 16382 = 255
⇒ ANY INPUT FLOATING IS READ AS HIGH LEVEL

CLOCK/CALENDAR

THE CLOCK/CALENDAR IS ADDRESSED AT 16380 AND 16381. POKING NUMBERS OUT AT 16380 (CLOCK CONTROL) WILL ALLOW YOU TO READ OR WRITE CERTAIN FUNCTIONS.

EXAMPLE SET CLOCK

POKE 16380, (F+64) <F= FUNCTION NUMBER>
POKE 16381, D <D= CLOCK/CALENDAR DATA>
POKE 16380, (F+80)
POKE 16380, 0

THESE STEPS SET UP ONLY ONE FUNCTION AND HAVE TO BE REPEATED TO SET THE ENTIRE CLOCK/CALENDAR. IN THE NEXT EXAMPLE WE WILL SET THE ONES PLACE OF THE MINUTES TO A 7.

EXAMPLE (XX:X7:XX)

POKE 16380, (2+64) (THE 2 IS THE FUNCTION #
OF THE ONES PLACE IN THE MIN. <M1>
POKE 16381, 7 DATA
POKE 16380, (2+80)
POKE 16380, 0

READ CLOCK/CALENDAR

READING THE CLOCK IS SIMILAR TO SETTING IT AND IS DONE A FUNCTION AT A TIME.

GENERAL EXAMPLE

POKE 16380, 96
POKE 16380, 96+F F= THE FUNCTION
LET D = PEEK 16381 D= DATA
POKE 16380, 0

EXAMPLE

READ THE TENS PLACE IN MINUTES. (XX:DX:XX)
POKE 16380, 96
POKE 16380, 96+3
LET D= PEEK 16381
POKE 16380, 0

IN THIS CASE IF THE CLOCK READS 27 MINUTES 'D' WOULD EQUAL 2

HERE ARE SOME SUBROUTINES TO SET AND READ THE CLOCK. S1 AND S10 ARE RESET TO 0 IRRESPECTIVE OF INPUT DATA WHEN ADDRESSING FUNCTIONS 0 AND 1. THERE ARE TWO WAYS TO READ THE CLOCK SUBROUTINE PROGRAM. THE FIRST WAY IS TO READ IT DIRECTLY FROM THE ARRAY. THE SUBSCRIPT IN THE ARRAY (NUMBER IN PARENTHESIS) IS ONE GREATER THAN THE FUNCTION. FOR EXAMPLE, IF YOU WANT TO READ THE ONES PLACE IN THE HOURS THIS WOULD BE FUNCTION #4, BUT THE SUBSCRIPT NUMBER THAT GOES IN THE ARRAY WOULD BE 5. T\$(5)=H1 THIS WAY USES LESS MEMORY BECAUSE YOU CAN ELIMINATE LINES 8300 - 8330 AND 7100 - 7130 AND CHANGE LINE 8095 TO '8095 RETURN '. THE SECOND WAY TO READ THE CLOCK/CALENDAR IS TO USE THE VARIABLES WHICH COMBINES THE ONES AND TENS PLACE OF EACH FUNCTION.

ASSIGNED VARIABLES

SE = SECONDS	WE = WEEK (0-6)
MI = MINUTES	DA = DAY
HO = HOURS	MO = MONTH
M\$ = MODE (AM,PM,24)	YE = YEAR
	L\$ = LEAP YEAR

8K ROM; 2K RAM

THE CLOCK AND CALENDAR SUBROUTINES ARE SEPARATED TO SAVE MEMORY IF ONE IS NOT NEEDED. THESE SUBROUTINES ALONG WITH THE MAIN PROGRAM WILL PRINT OUT THE TIME AND DATE AT THE TOP OF THE SCREEN.

MAIN

```
100 GOSUB 8000
103 CLS
104 PRINT " "
105 PRINT T$(6);T$(5);":":T$(4)
;T$(3);":":T$(2);T$(1);" ";M$
200 GOSUB 7000
215 PRINT
220 PRINT WE; " ";MO;"/";DA;"/";
YE
225 IF INKEY$="A" THEN STOP
230 GOTO 100
```

DATE

```
7000 DIM T$(13)
7010 FOR F=6 TO 12
7020 POKE 16380,96
7030 POKE 16380,96+F
7040 LET ZQ=FEEK 16381
7050 POKE 16380,0
7060 LET NQ=F+1
7070 IF F=8 THEN GOSUB 7900
7080 LET T$(NQ)=STR$ ZQ
7090 NEXT F
7100 LET WE=VAL T$(7)
7110 LET DA=10*(VAL T$(9))+VAL T
$(8)
7120 LET MO=10*(VAL T$(11))+VAL
T$(10)
7130 LET YE=10*(VAL T$(13))+VAL
T$(12)
7900 IF ZQ>=4 THEN GOTO 7930
7910 LET L$="NOT LEAP YEAR"
7920 RETURN
7930 LET L$="LEAP YEAR"
7940 LET ZQ=ZQ-4
7950 RETURN
```

TIME

```
8000 DIM T$(6)
8010 FOR F=0 TO 5
8020 POKE 16380,96
8030 POKE 16380,96+F
8040 LET ZQ=FEEK 16381
8050 POKE 16380,0
8060 LET NQ=F+1
8070 IF F=5 THEN GOSUB 8100
8080 LET T$(NQ)=STR$ ZQ
8090 NEXT F
8095 GOTO 8300
8100 IF ZQ>=8 THEN GOTO 8120
8110 GOTO 8140
8120 LET M$="24"
8130 LET ZQ=ZQ-8
8140 LET M$="AM"
8150 IF ZQ>=4 THEN GOTO 8170
8160 RETURN
8170 LET M$="PM"
8180 LET ZQ=ZQ-4
8190 RETURN
8300 LET SE=10*(VAL T$(2))+VAL T
$(1)
8310 LET MI=10*(VAL T$(4))+VAL T
$(3)
8320 LET HO=10*(VAL T$(6))+VAL T
$(5)
8330 RETURN
```

±30 SEC.

```
9000 POKE 16380,128
9010 PRINT "30 SEC. RESET"
9020 POKE 16380,0
9030 STOP
```

8K ROM; 1K RAM

THE SET PROGRAM WORKS IN A SIMILAR MANNER AS THE READ PROGRAM (M1 IS F=3, M10 IS F=4, H1 IS F=5 ETC.). THE BATTERY BACK-UP WILL KEEP THE CLOCK GOING SO THIS PROGRAM SHOULDN'T BE USED TOO OFTEN.

EXAMPLE RUN PROGRAM AND SET TIME TO 06:27:00 AM

FUNCTION?

3

VALUE?

2 -

FUNCTION?

4

VALUE?

2 -

FUNCTION?

5

VALUE?

8 -

FUNCTION?

6

VALUE?

0 -

ENTER AM,PM, OR 24

"AM"

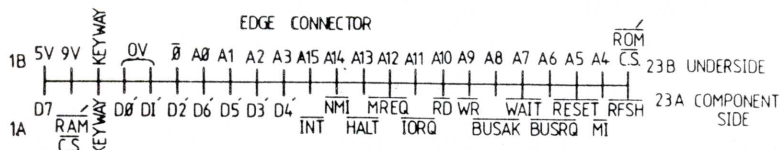
FUNCTION?

0

(TO END)

```
5000 100 PRINT "FUNCTION?"
5010 110 INPUT N
5020 120 PRINT N
5030 130 PRINT "VALUE"
5040 140 INPUT V
5050 150 PRINT V
5060 160 LET F=N-1
5070 170 IF F=-1 THEN STOP
5080 180 IF F=5 THEN GOSUB 250
5090 190 IF F=8 THEN GOSUB 300
5100 200 POKE 16380,(F+64)
5110 210 POKE 16381,V
5120 220 POKE 16380,(F+80)
5130 230 POKE 16380,0
5140 240 GOTO 100
5150 250 PRINT "ENTER AM,PM OR 24"
5160 260 INPUT M$
5170 270 IF M$="24" THEN LET V=V+8
5180 280 IF M$="PM" THEN LET V=V+4
5190 290 RETURN
5200 300 PRINT "LEAP YEAR? (Y/N)"
5210 310 INPUT L$
5220 320 IF L$="Y" THEN LET V=V+4
5230 330 RETURN
```


ZX-81 / TIMEX



COMPONENTS SIDE TOP

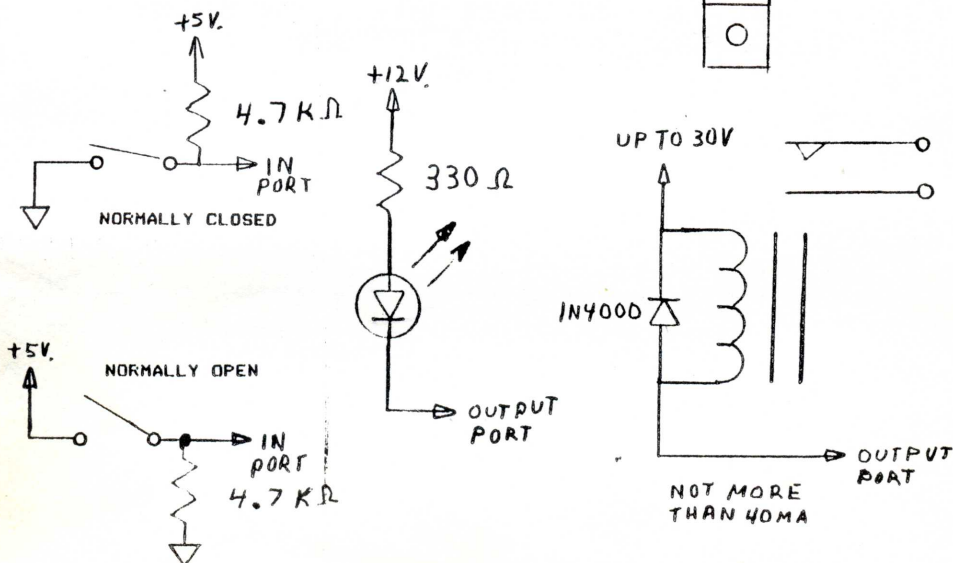
5 VOLTS	22
8 VOLTS	21
GND	20
BATT. BACK UP	19
30 SEC. CORRECTION	18
OUTPUT (1)	17
OUTPUT (0)	16
OUTPUT (6)	15
OUTPUT (7)	14
OUTPUT (2)	13
OUTPUT (5)	12
OUTPUT (3)	11
OUTPUT (4)	10
INPUT (0)	9
INPUT (1)	8
INPUT (2)	7
INPUT (3)	6
INPUT (4)	5
INPUT (5)	4
IUPUT (6)	3
IUPUT (7)	2
GND	1

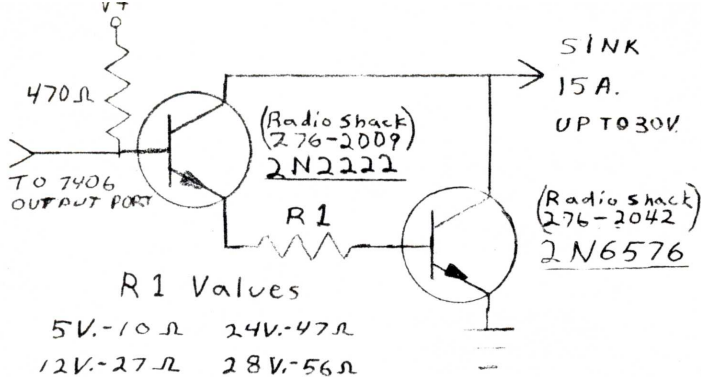
BOTTOM

Z	2Y3
Y	1Y0
X	1Y0
W	1Y3
V	1Y3
U	2Y2
T	D7'
S	D6'
R	D5'
F	D4'
N	D3'
M	D2'
L	D1'
K	D0'
J	D4
H	D3
F	D5
E	D6
D	D2
C	D1
B	D0
A	D7

PORT CONNECTOR

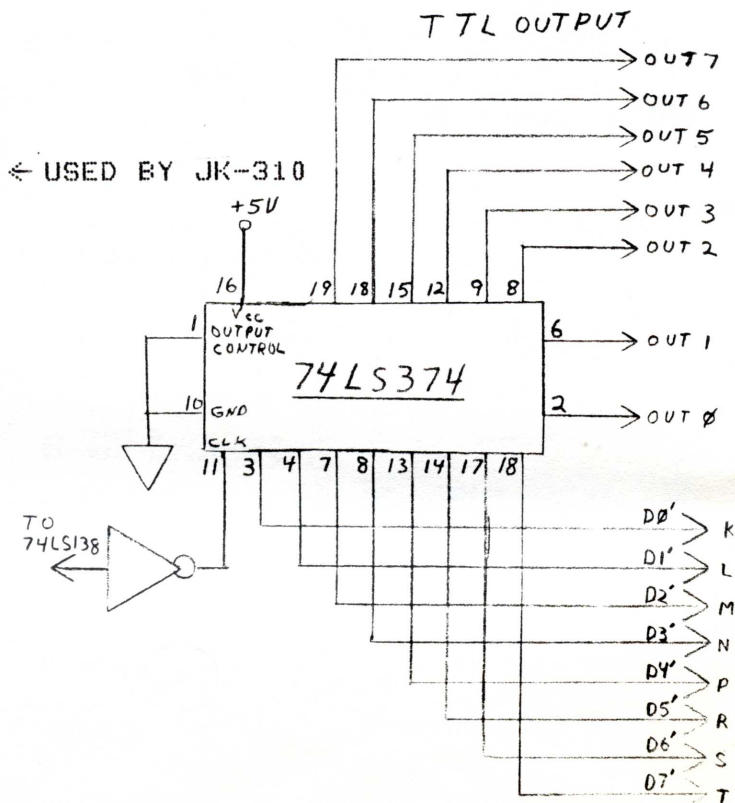
THE TOP OF THE EDGE CONNECTOR HAS ALL THE I/O PORTS AND POWER. THIS DESIGN WAS IMPLEMENTED SO THAT A SINGLE SIDED EDGE CONNECTOR COULD BE USED IF YOU WERE ONLY INTERESTED IN THE I/O PORTS. THE BOTTOM EDGE HAS NON-BUFFERED DATA LINES FOR INPUT DEVICES AND BUFFERED LINES FOR OUTPUT DEVICES. IT ALSO HAS ADDRESS SIGNALS SO THAT THE ACCESSORY BOARDS CAN RECEIVE THE CONTROL WORD.



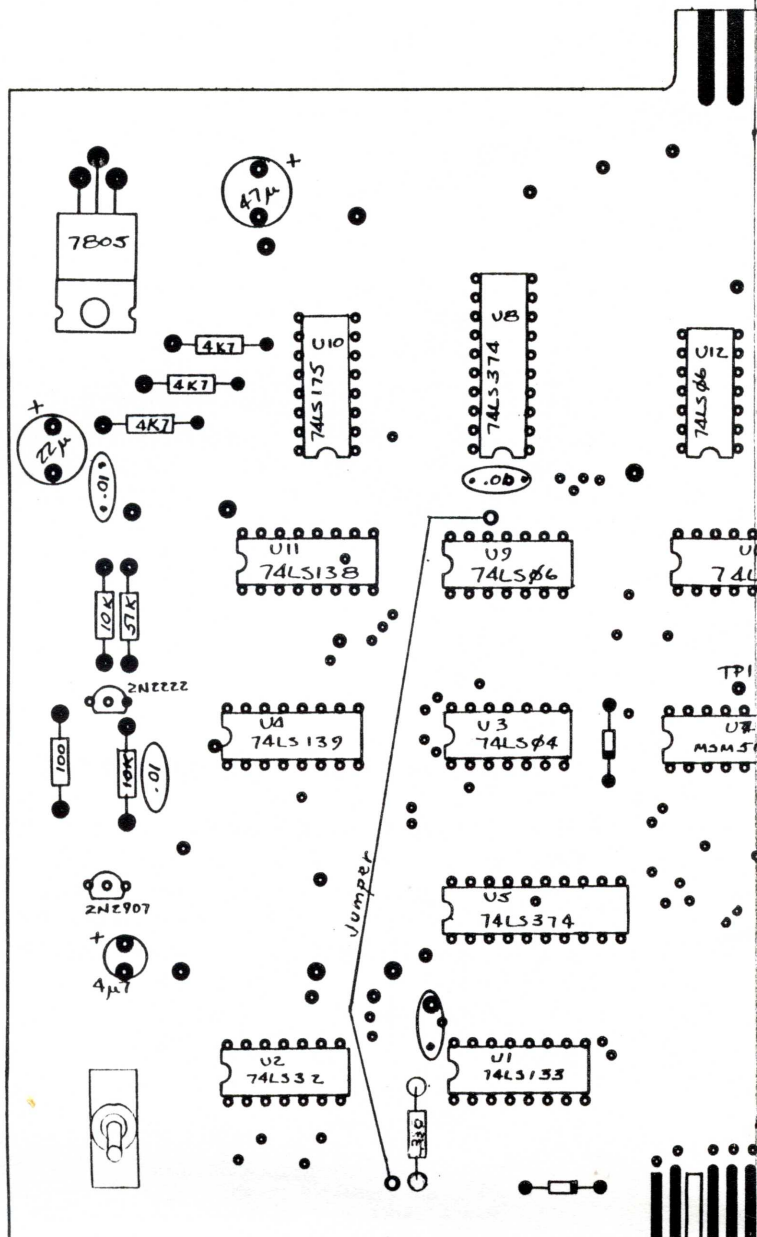


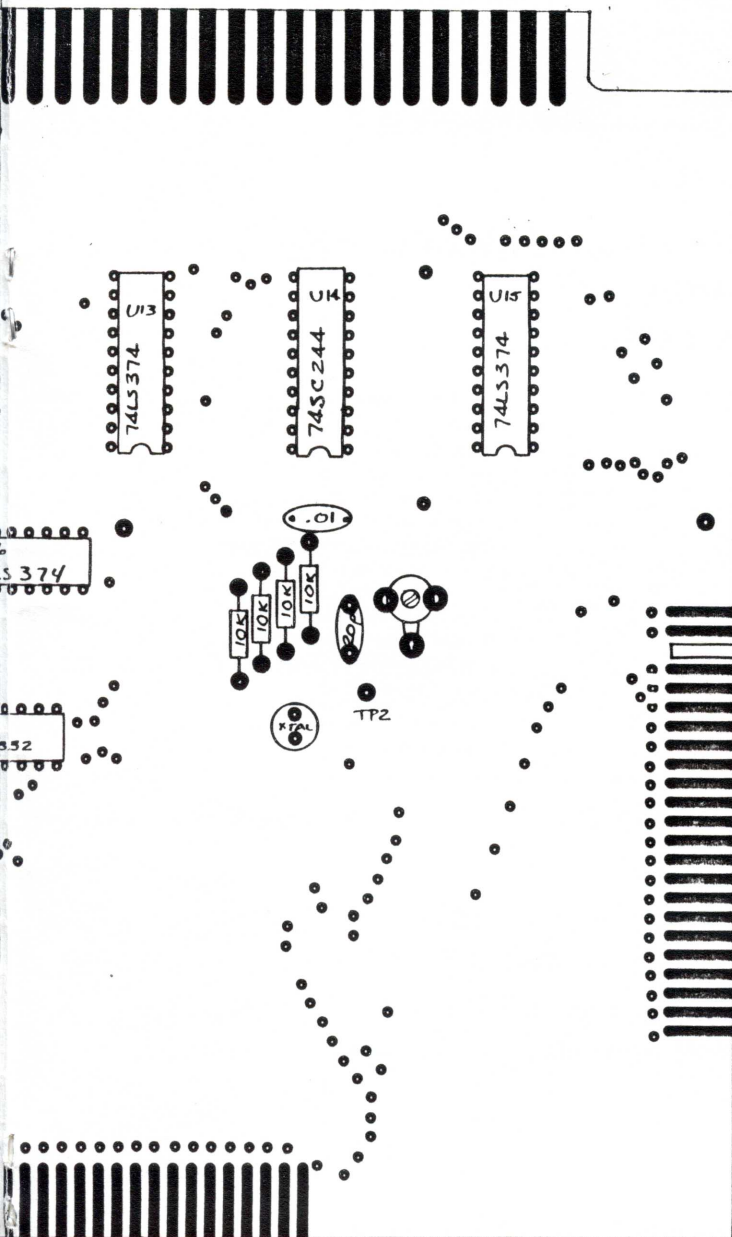
THE JK-310 IS EXPANDABLE WITH THE USE OF A CONTROL WORD. WE USE THE MIDDLE DIGIT OF THE MODEL NUMBER FOR THIS PURPOSE. THE REST OF THE NUMBERS ARE, SO FAR, ARE FREE TO USE FOR YOUR OWN ACCESSORIES. HERE ARE SOME SCHEMATICS OF EXTRA INPUT/OUTPUT PORTS. THE CONTROL WORD CAN BE CHANGED ON THE NEW PORT BY MOVING THE CONTROL LINE FROM THE (U13) 74LS374 TO DIFFERENT PINS ON THE (U11) 74LS138 (SEE TABLE).

WORD	PIN
Y0	15
Y1	14
Y2	13
Y3	12
Y4	11
Y5	10
Y6	9
Y7	7



MODIFICATION ZX-80 / MICROACE





COMPONENT PLACEMENT	
JK 310	
	9-16-BZ 3x4

MSM5832 MICROPROCESSOR REAL-TIME CLOCK/CALENDAR

GENERAL DESCRIPTION

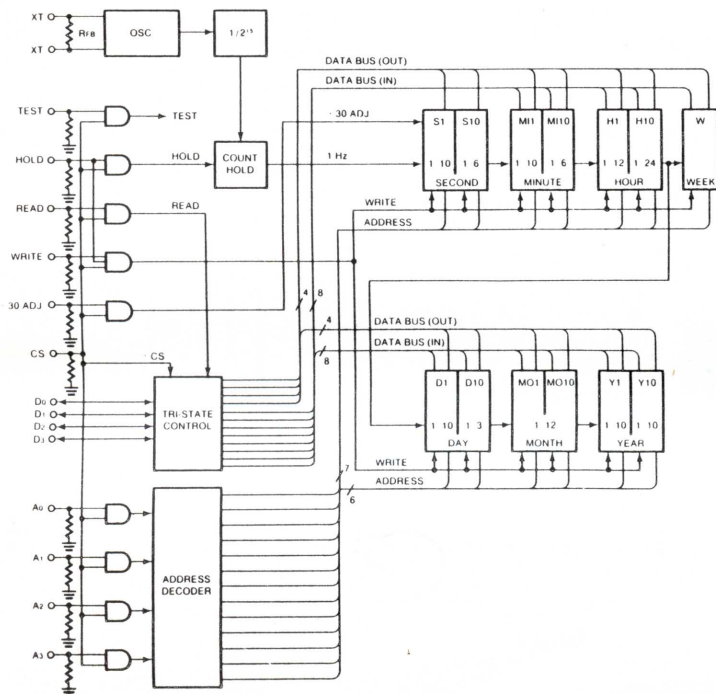
The MSM5832 is a monolithic, metal-gate CMOS integrated circuit that functions as a real time clock/calendar for use in bus-oriented microprocessor applications. The on-chip 32,768 Hz crystal controlled oscillator time base is counted down to provide addressable 4-bit I/O data of SECONDS, MINUTES, HOURS, DAY-OF-WEEK, DATE, MONTH, and YEAR. Data access is controlled by 4-bit address, chip select, read, write and hold inputs. Other functions include 12H/24H format selection, leap year identification and manual ± 30 second correction.

The MSM5832 normally operates from a 5 volt $\pm 5\%$ supply. Battery back-up operation down to 2.2 volts allows continuation of time keeping when main power is off. One test input facilitates rapid testing of the time keeping operations. The MSM5832 is offered in an 18-lead dual-in-line plastic (RS suffix) package.

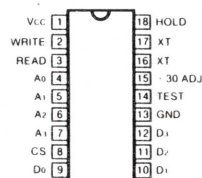
FEATURES

- Microprocessor bus-oriented
- TIME MONTH DATE YEAR DAY OF WEEK
23:59:59 12 - 31 - 99 - 7
- 4-BIT DATA BUS
- 4-BIT ADDRESS
- Read, Write, Hold, Chip select inputs
- Interrupt signal outputs—1024, 1, 1/60, 1/3600 Hz
- 32,768 KHz crystal controlled operation
- Leap year register bit
- 12 or 24 hour format
- ± 30 second error correction
- Single 5 volt power supply
- Back-up battery operation to $V_{CC}=2.2$ V
- Low Power Dissipation
90 μ W Max. at $V_{CC}=3$ V
2.5 mW Max. at $V_{CC}=5$ V
- High Density 300 mil 18-Pin Package

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



- A0 to A3: Address Inputs
- WRITE: Write Enable
- READ: Read Enable
- HOLD: Count Hold Enable
- CS: Chip Select
- D0 to D3: Data Input/Output
- TEST: Test Input
- ± 30 ADJ: ± 30 Second Correction Input
- XT & XT-bar: xtal oscillator connections
- Vcc: +5 V Supply
- GND: Ground

FUNCTION TABLE

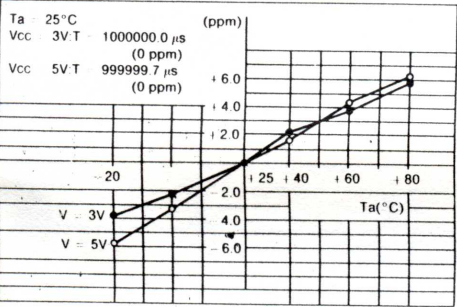
FIGURE 1

ADDRESS INPUTS				INTERNAL COUNTER	DATA I/O				DATA LIMITS	NOTES
A0	A1	A2	A3		D0	D1	D2	D3		
0	0	0	0	S 1	*	*	*	*	0 ~ 9	S1 or S10 are reset to zero irrespective of input data D0~D3 when write instruction is executed with address selection
1	0	0	0	S 10	*	*	*	*	0 ~ 5	
0	1	0	0	MI 1	*	*	*	*	0 ~ 9	
1	1	0	0	MI 10	*	*	*	*	0 ~ 5	
0	0	1	0	H 1	*	*	*	*	0 ~ 9	D2 = "1" for PM D3 = "1" for 24 hour format D2 = "0" for AM D3 = "0" for 12 hour format
1	0	1	0	H 10	*	*	†	†	0 ~ 1 0 ~ 2	
0	1	1	0	W	*	*	*	*	0 ~ 6	
1	1	1	0	D 1	*	*	*	*	0 ~ 9	
0	0	0	1	D 10	*	*	†	*	0 ~ 3	D2 = "1" for 29 days in month 2 D2 = "0" for 28 days in month 2 (2)
1	0	0	1	MO 1	*	*	*	*	0 ~ 9	
0	1	0	1	MO 10	*	*	*	*	0 ~ 1	
1	1	0	1	Y 1	*	*	*	*	0 ~ 9	
0	0	1	1	Y 10	*	*	*	*	0 ~ 9	

(1) * data valid as "0" or "1"
blank does not exist (unrecognized during a write and held at "0" during a read)
† data bits used for AM/PM, 12/24 HOUR and leap year
(2) If D2 previously set to "1", upon completion of month 2 day 29, D2 will be internally reset to "0"

TYPICAL CHARACTERISTICS—Oscillator Frequency Deviations

Frequency Deviation vs Temperature



Frequency Deviation vs Supply Voltage

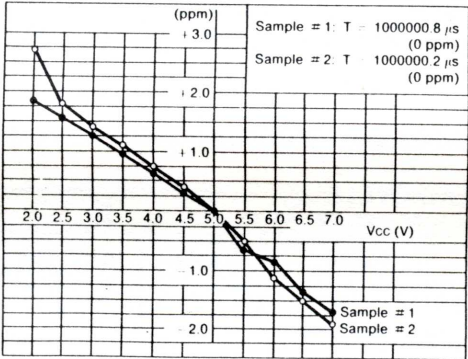


FIGURE 2

FIGURE 3

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Supply Voltage	V _{CC}	- 0.3 ~ 7.0	V
Input Voltage	V _{IN}	- 0.3 ~ V _{CC} + 0.3	V
Data I/O Voltage	V _D	- 0.3 ~ V _{CC} + 0.3	V
Storage Temperature	T _{stg}	- 55 ~ 150	°C

Note: Stresses above those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or at any other condition above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

OPERATING CONDITIONS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Supply Voltage	V _{CC}	4.75	5	5.25	V	5V ± 5%
Standby Supply Voltage	V _{CCS}	2.2	5	7	V	
Input Signal Level	V _{IH}	3.6	5	V _{CC}	V	V _{CC} = 5V ± 5% Respect to Gnd
	V _{IL}	- 0.3	0	0.8	V	
Crystal Oscillator Freq.	f(xT)	32.768			KHz	
Operating Temperature	T _a	- 30		+ 85	°C	

DC CHARACTERISTICS

(V_{CC} = 5V ± 5%; T_a = - 30 to + 85°C, unless otherwise noted)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input Current (1)	I _{TH}	10	25	50	μA	V _{IN} = 5V
	I _{IL}	- 1		1	μA	V _{IN} = 0V
Data I/O Leakage Current	I _{LD}	- 1		1	μA	V _{I/O} = 0 to V _{CC} , CS = "0"
Output Low Voltage	V _{OL}			0.4	V	I _O = 1.6 ma, CS = "1", READ = "1"
Output Low Current	I _{OL}	1.6			mA	V _O = 0.4V, CS = "1", READ = "1"
Operating Supply Current	I _{CCS}			30	μA	V _{CC} = 3V, T _a = 25°C
	I _{CC}			500	μA	V _{CC} = 5V, T _a = 25°C

(1) XT, XT and DO~D3 excluded.

AC CHARACTERISTICS

CAPACITANCE

T_A = 25°C, f = 1 MHz

Parameter	Symbol	Min.	Typ.	Max.	Unit
Input/Output Capacitance	C _{I/O}			8	pF
Input Capacitance	C _{IN}			5	pF

Note: This parameter is periodically sampled and not 100% tested.

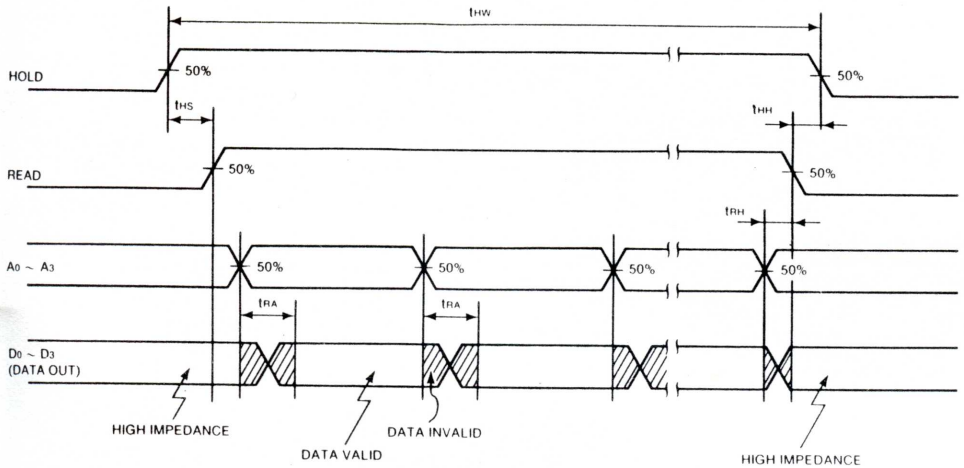
READ CYCLE

(V_{CC} = 5V ± 5%; T_a = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
HOLD Set-up Time	t _{HS}	150			μS
HOLD Hold Time	t _{HH}	0			μS
HOLD Pulse Width	t _{HW}			1	SEC
READ Hold Time	t _{RH}	0			μS
READ Access Time	t _{RA}			6	μS

READ CYCLE

FIGURE 4



- Notes: 1. A Read occurs during the overlap of a high CS and a high READ
 2. Output Load: 1 TTL Gate, $C_L = 50$ pf and $R_L = 4.7$ K Ω
 3. CS may be a permanent "1", or may be coincident with HOLD pulse

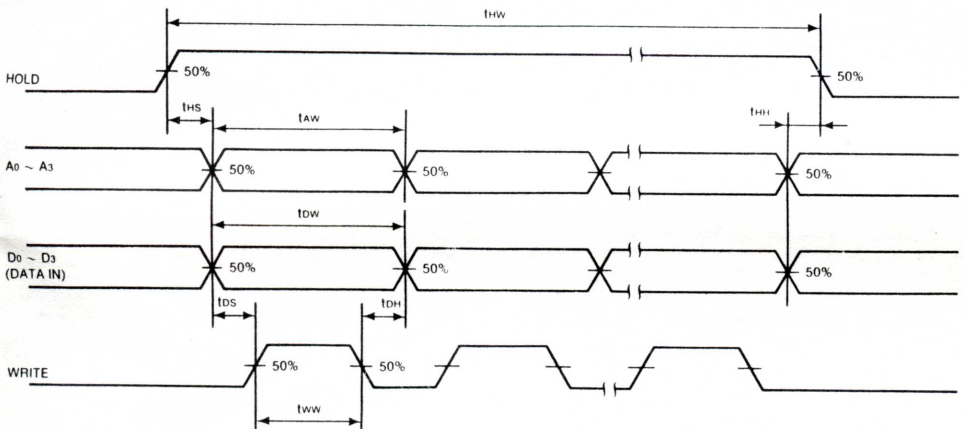
WRITE CYCLE

($V_{CC} = 5V \pm 5\%$; $T_a = 25^\circ C$)

Parameter	Symbol	Min.	Typ.	Max.	Unit
HOLD Set-up Time	t _{HS}	150			μS
HOLD Hold Time	t _{HH}	0			μS
HOLD Pulse Width	t _{HW}			1	SEC
ADDRESS Pulse Width	t _{AW}	1.7			μS
DATA Pulse Width	t _{DW}	1.7			μS
DATA Set-up Time	t _{DS}	0.5			μS
DATA Hold Time	t _{DH}	0.2			μS
WRITE Pulse Width	t _{WW}	1.0			μS

WRITE CYCLE

FIGURE 5



- Notes: 1. A WRITE occurs during the overlap of a high CS, a high HOLD and a high WRITE
 2. CS may be a permanent "1", or may be coincident with HOLD pulse

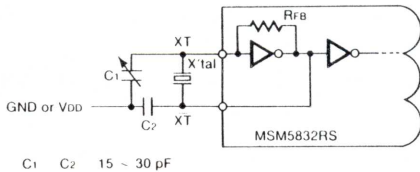
FUNCTIONAL DESCRIPTION

A block diagram of the MSM5832 microprocessor real-time clock/calendar and a package connection diagram are shown on the first page. Figure 9 illustrates a method of interfacing between the clock/calendar circuit and a micro processor. Figures 9, 10 and 11 illustrate alternative standby power supply circuits. A function table listing relationships between address inputs, data input/output and internal counter selection is shown in Figure 1. Unless otherwise indicated, the following descriptions are based on the block diagram.

32.768 K Hz OSCILLATOR (pins 16 and 17): An internal inverting amplifier with feedback resistor, RFB, is connected with a crystal and two capacitors as shown in Figure 6 to form a stable, accurate oscillator—which serves as the precision time base of the circuit. Capacitors C1 and C2 in series provide the parallel load capacitance required for precise tuning of the quartz crystal. Typical oscillator performance as a function of ambient temperature and supply voltage is shown in Figures 2 and 3 respectively.

OSCILLATOR CIRCUIT

FIGURE 6



CHIP SELECT (pin 8): Connecting CS input to VCC enables all inputs and outputs. Unconnected—pull-down to GND is provided by an internal resistor—or connecting CS to GND will disable HOLD, WRITE, READ, +30 ADJ, D0~D3, A0~D3 and TEST.

As shown in Figure 9 CS can be used to detect system power failure by connecting system power (+5V) to CS, so that when system power is on, all inputs and outputs will be enabled, and when system power is off, all inputs and outputs will be disabled. The threshold voltage of CS is higher than all other inputs to insure correct operation of this function.

HOLD (pin 18): Switching this input to VCC inhibits the internal 1Hz clock to the S1 counter. After the specified HOLD set-up time (150 μ s), all counters will be in a static state, thus allowing error-free read or write operations. So long as the HOLD pulse width is less than 1 second, accuracy of the real time will be undisturbed. Pull-down to GND is provided by an internal resistor.

READ (pin 3): Read function as shown in Figure 4 is enabled when READ is switched to VCC. Pull-down to GND is provided by an internal resistor.

WRITE (pin 2): Write function as shown in Figure 5 is enabled when WRITE is switched to VCC. Pull-down to GND is provided by an internal resistor.

+30 ADJ (Pin 15): Momentarily connecting this input to VCC (>31.25 ms) will reset seconds (S1, S10 counters and $2^{11} \sim 2^{15}$ frequency dividers) to 00; if seconds were 30 or more, one minute is added to the minutes (MI 1 counter) and if seconds were less than 30, the minutes are unchanged. Pull-down to GND is provided by an internal resistor.

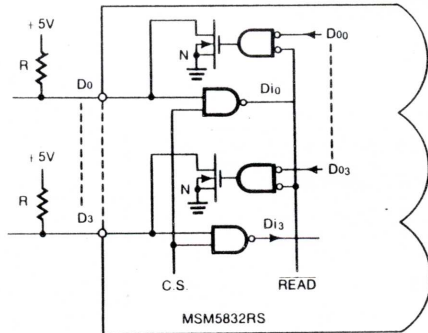
A0 ~ A3 (pins 4 ~ 7): Address inputs, used to select internal counters for read/write operations (see function table—Figure 7). A "1" is defined as VCC; a "0" is GND. Pull-down to GND is provided by internal resistors.

D0 ~ D3 (pins 9 ~ 12): Data Inputs/Outputs, two-way bus lines controlled by READ and WRITE inputs. As shown in Figure 7 external pull-up resistors of 4.7K or higher are required by the open-drain N-channel MOS outputs. D3 is the MSB; D0 is the LSB.

TEST (pin 14): Normally this input is unconnected—pull-down to GND is provided by an internal resistor—or connected to GND. With CS at VCC, pulses to VCC on the TEST input will directly clock the S1, MI10, W, D1 and Y1 counters, depending on which counter is addressed (W and D1 are selected by D1 address in this mode only). Roll-over to next counter is enabled in this mode.

DATA I/O CIRCUIT

FIGURE 7



REFERENCE SIGNAL OUTPUT

Reference signals are available as outputs on D0 ~ D3 if CS, READ and A0 ~ A3 are at VCC. Refer to Figure 8 for specifics. As shown in Figure 9 these signals may be used to generate interrupts for the microprocessor.

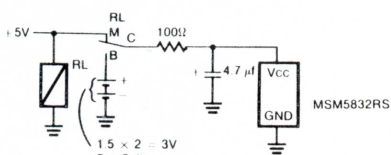
REFERENCE SIGNAL OUTPUTS

FIGURE 8

CONDITIONS	OUTPUT	REFERENCE FREQUENCY	PULSE WIDTH
HOLD = L	D0 (1)	1024 Hz	duty 50%
READ = H	D1	1 Hz	122.1 μ s
C.S. = H	D2	1/60 Hz	122.1 μ s
A0 ~ A3 = H	D3	1/3600 Hz	122.1 μ s

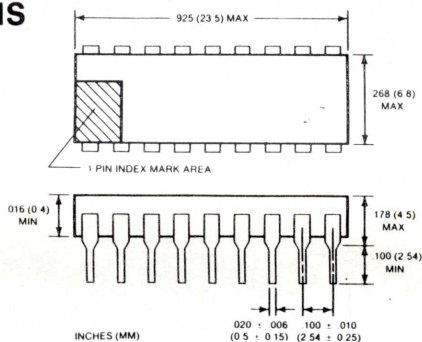
(1) 1024 Hz signal at D0 not dependent on HOLD input level

FIGURE 9

**FIGURE 10**

PACKAGE SPECIFICATIONS

18 LEAD PLASTIC (RS)



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WARRANTY

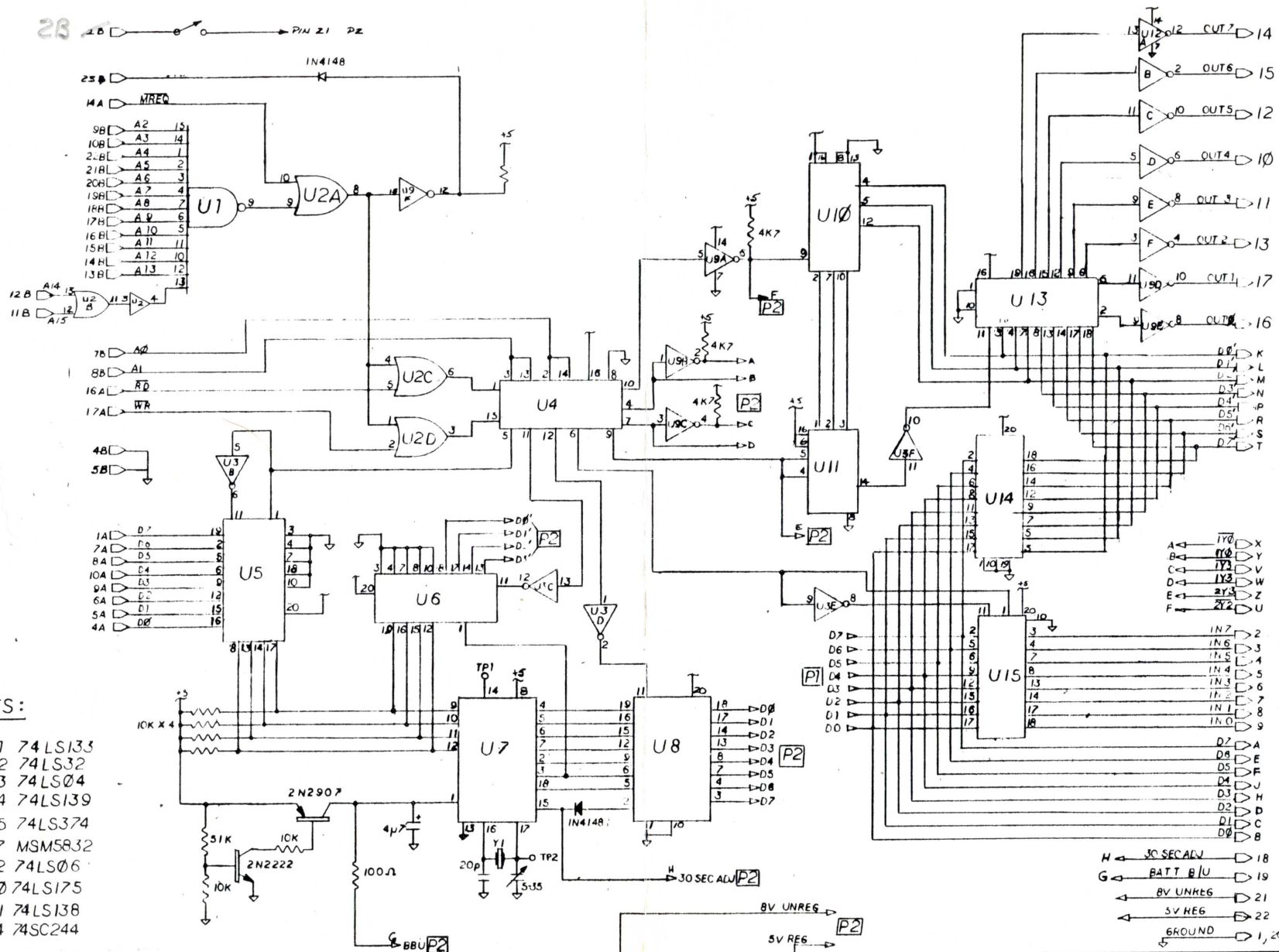
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TO SINCLAIR EXPANSION CONNECTOR

2B 20 → PIN 21 P2



NOTES:

IC'S

- U1 74LS133
- U2 74LS32
- U3 74LS04
- U4 74LS139
- U5,6,13,15 74LS374
- U7 MSM5832
- U9,12 74LS06
- U10 74LS175
- U11 74LS138
- U14 74LS244

- H 30 SEC ALV 18
- G BATT B/U 19
- 8V UNREG 21
- 5V REG 22
- GROUND 1, 20

SINCLAIR INTERFACE JK310

SCALE:	APPROVED BY:	DRAWN BY INSCON
DATE: 9-12-82		REVISED 9-8-82
		DRAWING NUMBER
		31001